

# PATENT SPECIFICATION



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## COMPLETE SPECIFICATION.

### Improvements in or relating to Speed Reducing or Variable Speed Gearing.

I, RICHARD JOHN TUGWOOD, of 77, Chancery Lane, London, W.C. 2, in the County of Middlesex, British subject, do hereby declare the nature of this invention (a communication from Società Anonima Industrie Riunite Cantieri di Cortona, of Cortona, Italy, a company incorporated under the laws of Italy) and in what manner the same is to be performed, to be particularly described and ascertained in and by the following statement:—

This invention comprises improvements in and connected with reducing speed or variable speed gearing, and has for its object to provide a simple and efficient mechanism adapted for example, for giving a reduced speed transmission from a high speed motor shaft; or for giving variable speed and, if desired, for permitting also for reversal and braking.

A revolving eccentric meeting with a body movable in a plane normal to the axis of revolution has the effect of dis- placing the said body in that plane. If the said body be revolvably mounted and engaged with a circular path, the body will be revolved and such revolution may be utilized either for turning the mount- ing of the said body or the circular path with which the body is engaged as afore- said and such turning will have an angular relation with the turning of the eccentric. By providing the eccentric with a roller or ball bearing ring for making the driving contact, friction losses are avoided and the operation is rendered more efficient.

According to this invention, therefore, one of the shafts, as for example the driving shaft, is fitted with an eccentric

which is adapted to come into engagement successively with a number of toothed devices each of which is revolute about its own axis, these revolute toothed devices being revolvably mounted in a part hereinafter referred to as the carrier. A ring enclosing the carrier is formed with internal teeth adapted for meshing with the teeth of the revolute devices and it will be apparent that by arresting the motion of the carrier or of the ring, or by partially arresting the motion of both, various speed transmissions may be obtained, as will be hereinafter explained. If desired, the apparatus may be operated so as to act as a brake.

In order to enable the invention to be readily understood, reference is made to the accompanying drawings, in which:—

Figure 1 is a side elevation, with parts broken away and in section, of one suitable construction of apparatus embodying the features of the present invention.

Figure 2 is an end elevation as seen from the left hand side of Figure 1.

Figure 3 is a plan of Figure 1.

Figure 4 is a transverse section on the line A—B in Figure 1.

Figure 5 is a central vertical longitudinal section of Figure 1.

Referring to the drawings, A is a shaft which may be assumed to be the shaft of a motor from which transmission is desired at reduced speed. On the shaft A, there is an eccentric A<sup>1</sup> and, if desired, the eccentric A<sup>1</sup> may be enclosed by a ring A<sup>2</sup> with balls or rollers A<sup>3</sup> inter- posed between the ring A<sup>2</sup> and the eccentric A<sup>1</sup>. The shaft A is revolvably

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mounted within a hollow shaft B formed or fitted with the carrier which is a disc part B<sup>1</sup> hollowed out to permit of the revolution of the eccentric A<sup>1</sup> and formed 5 with slots for the reception of the revolute toothed devices D. The carrier disc B<sup>1</sup> may be in two parts divided in a vertical plane and bolted together as indicated in Figure 4, each disc part being 10 formed on or attached to a hollow shaft part B.

In the example shown, there are four toothed devices D spaced 90° apart around the carrier, the said devices having the 15 form of trefoils or three pointed stars. Each device D is formed with trunnions for revolutely mounting it in the carrier B<sup>1</sup>, the slots in the latter permitting the points or teeth of the devices D to project into the path of the eccentric ring A<sup>2</sup> on the interior and into the path of internal teeth C<sup>1</sup> of a ring C enclosing the carrier B<sup>1</sup>. As will be seen from 20 Figure 5, the ring C is bolted between two discs or cheeks C<sup>2</sup> which are formed or fixed upon hollow shaft parts C<sup>3</sup>, in which latter are journalled the shaft parts B.

First, let it be assumed that the ring C 30 and cheeks C<sup>2</sup> are fixed by bolting to the fixed framing parts and that the shaft A is driven by a motor. In this case, the eccentric A<sup>1</sup> is carried past the devices D in succession and as the lobe of the eccentric (or rather the ring A<sup>2</sup> anti-frictionally mounted around the latter) comes into contact with the inwardly projecting point or tooth of a device D it causes the latter to turn and to roll within 35 the toothed track of the ring C, as will be readily apparent from Figure 4. In this way, the carrier B<sup>1</sup> is carried round by the devices D at a slower rate of speed than the shaft A and this reduced speed 40 can be taken off the shaft B by any suitable means.

In the construction illustrated, the ring C and cheeks C<sup>2</sup> are not fixedly connected with the fixed framing of the 50 apparatus but are revolutely mounted by the shaft parts C<sup>3</sup> in suitable bearings K on the framing. In addition, the external periphery of these parts is encircled by a brake band L which may, as shown, be lined with a suitable gripping material. Also, the shaft B of the carrier B<sup>1</sup> is fitted with a brake drum M which is encircled by a brake band E. The brake band E has one end secured to 55 a shaft N extending beneath the apparatus parallel with the shaft A, and the opposite end secured to an arm O on that shaft. The brake band L has one end

secured to the shaft N and the opposite end secured to an arm P on the opposite side of the shaft N to that on which the arm O is situated. A hand lever Q is fitted on the shaft N and when the lever Q is in the position seen in Figure 4, the band L is tightened around the periphery of the parts C and C<sup>2</sup> whilst the band E is slack so that the drum M is quite free to turn. In this position of the parts, the ring C and cheeks C<sup>2</sup> are fixedly held and the operation takes place as above described. If, however, the hand lever Q be lowered from the position seen in Figure 4, the band L will be loosened and the band E tightened, so that the ring C and cheeks C<sup>2</sup> are now free to revolve and the drum M and the carrier B<sup>1</sup> are fixedly held. In this condition of these parts, the eccentric A<sup>1</sup> simply causes the devices D to revolve around their own axes without orbital motion, and the revolution of the devices D effects a driving of the ring C, cheek C<sup>2</sup> and shaft parts C<sup>3</sup>, the latter now turning in the reverse direction to that in which the shaft B turned but at about the same speed.

It will be realized that the speed of the driven part, i.e., either the part B or the part C<sup>3</sup> bears a direct angular relation with the speed of the driving part A and, further, that by varying the effects of the two brakes intermediate speeds may be obtained between zero and the maximum.

Having now particularly described and ascertained the nature of this invention and in what manner the same is to be performed, I declare that what I claim is:—

1. Reducing or variable speed mechanism comprising an eccentric, revolute toothed devices mounted around the eccentric and adapted to be revolved by engagement therewith, a carrier for the toothed devices, an internally toothed ring track in mesh with the toothed devices, and means for applying power to, or taking power off, the said eccentric and the said carrier, substantially as described.

2. Reducing or variable speed mechanism as claimed in Claim 1, in which the ring track is revolutely mounted and is fitted with means for taking off power therefrom substantially as described.

3. Reducing or variable speed mechanism as claimed in Claim 2, in which the carrier and the ring track are fitted with braking means which are under the control of simple operative means whereby the effect of one brake can be

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diminished whilst the effect of the other brake is increased, so that variable speed in either direction may be obtained substantially as described.

5 4. Reducing or variable and reversible speed mechanism, also adapted for use as a brake, comprising the various parts constructed, arranged and adapted to

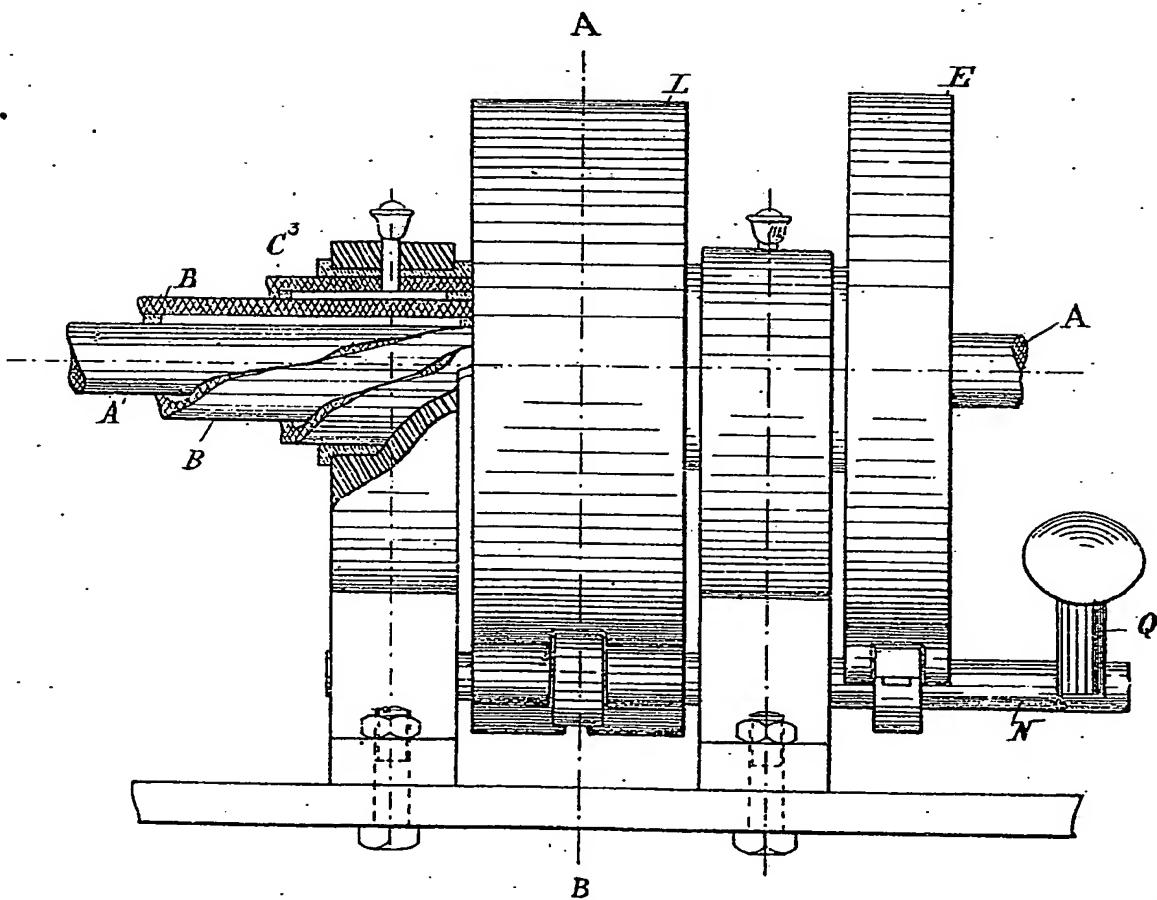
operate substantially as hereinbefore described with reference to the accompanying drawings. 10

Dated this 13th day of April, 1921.

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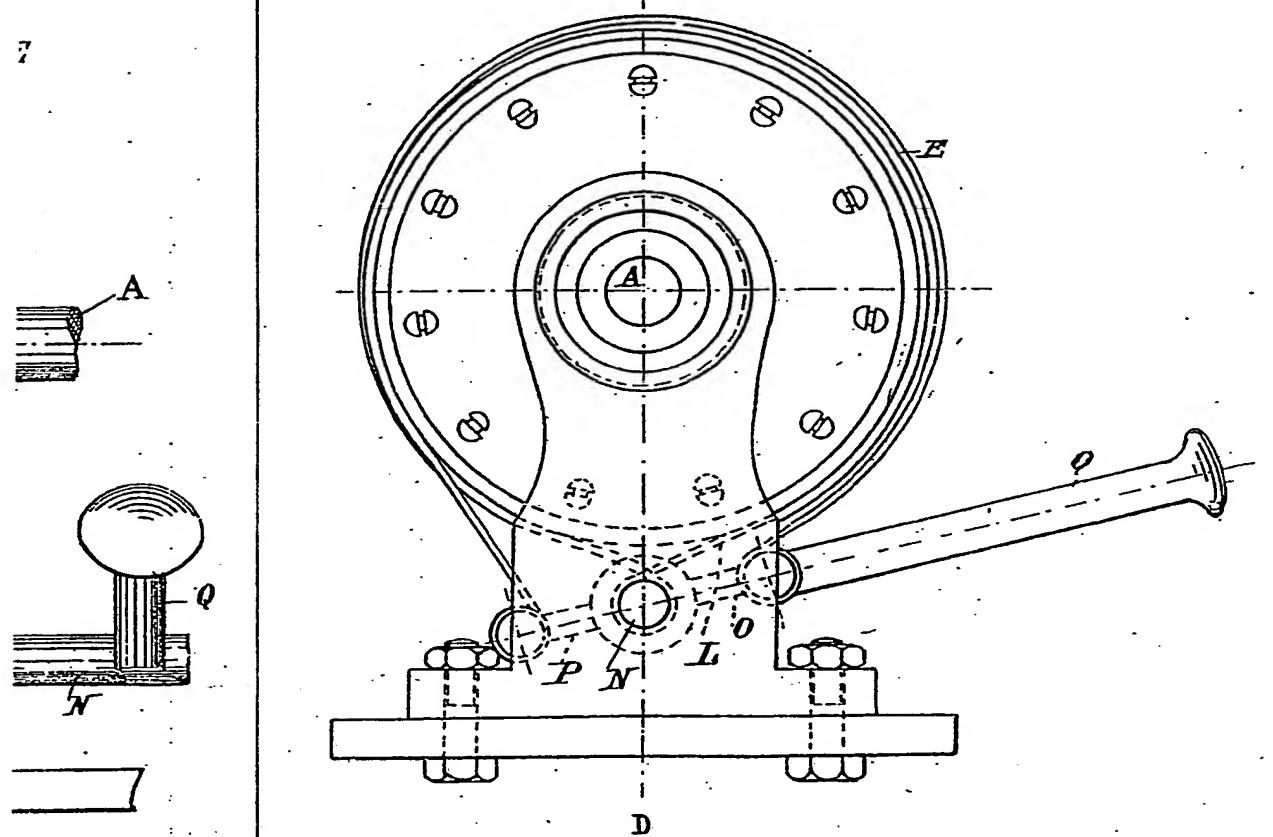
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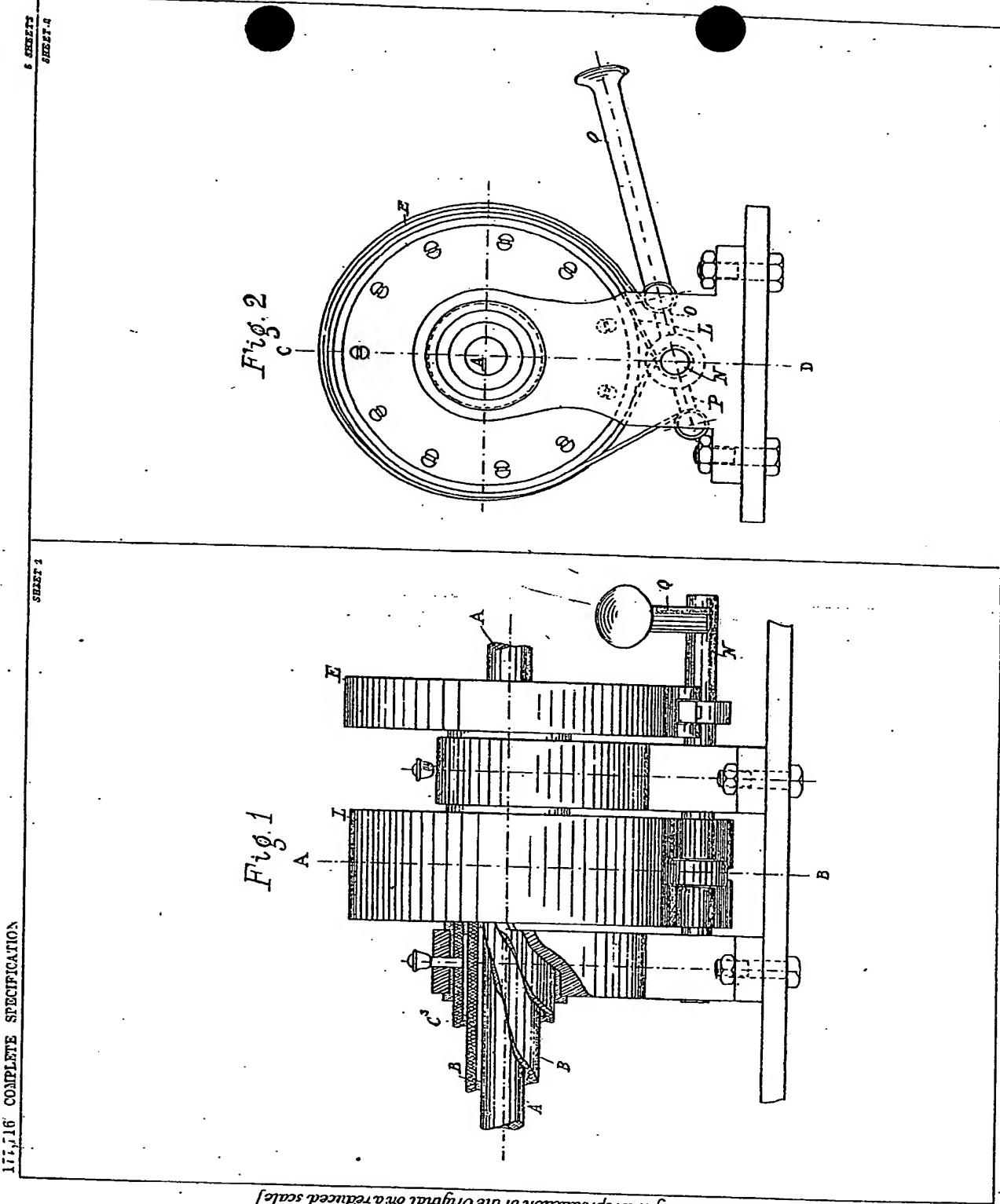
Fig. 1



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Fig. 2

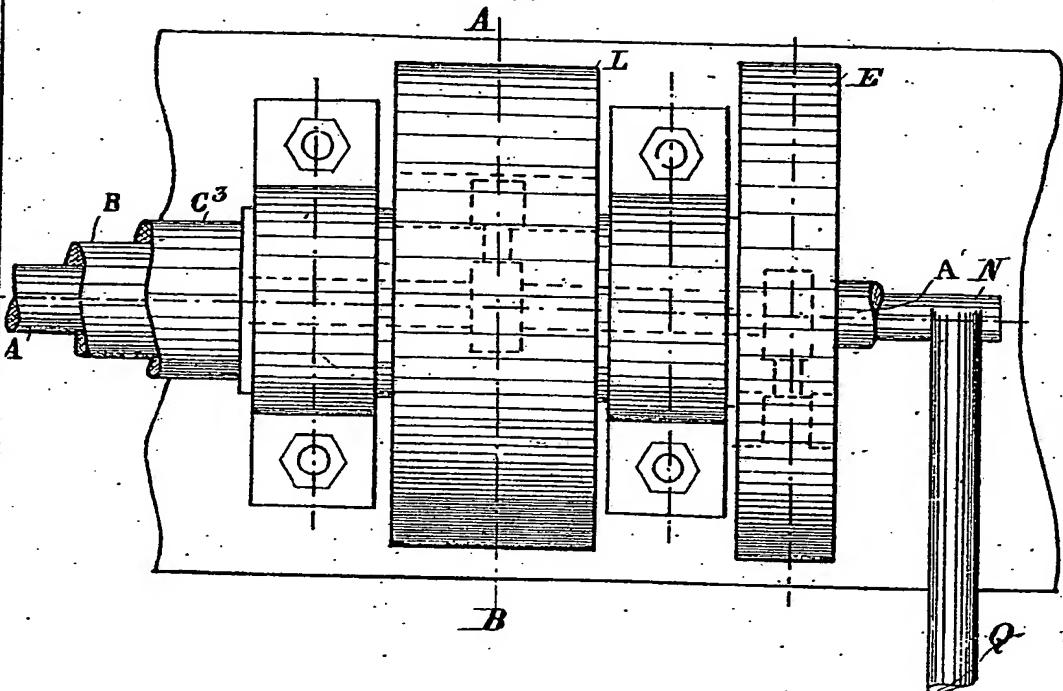




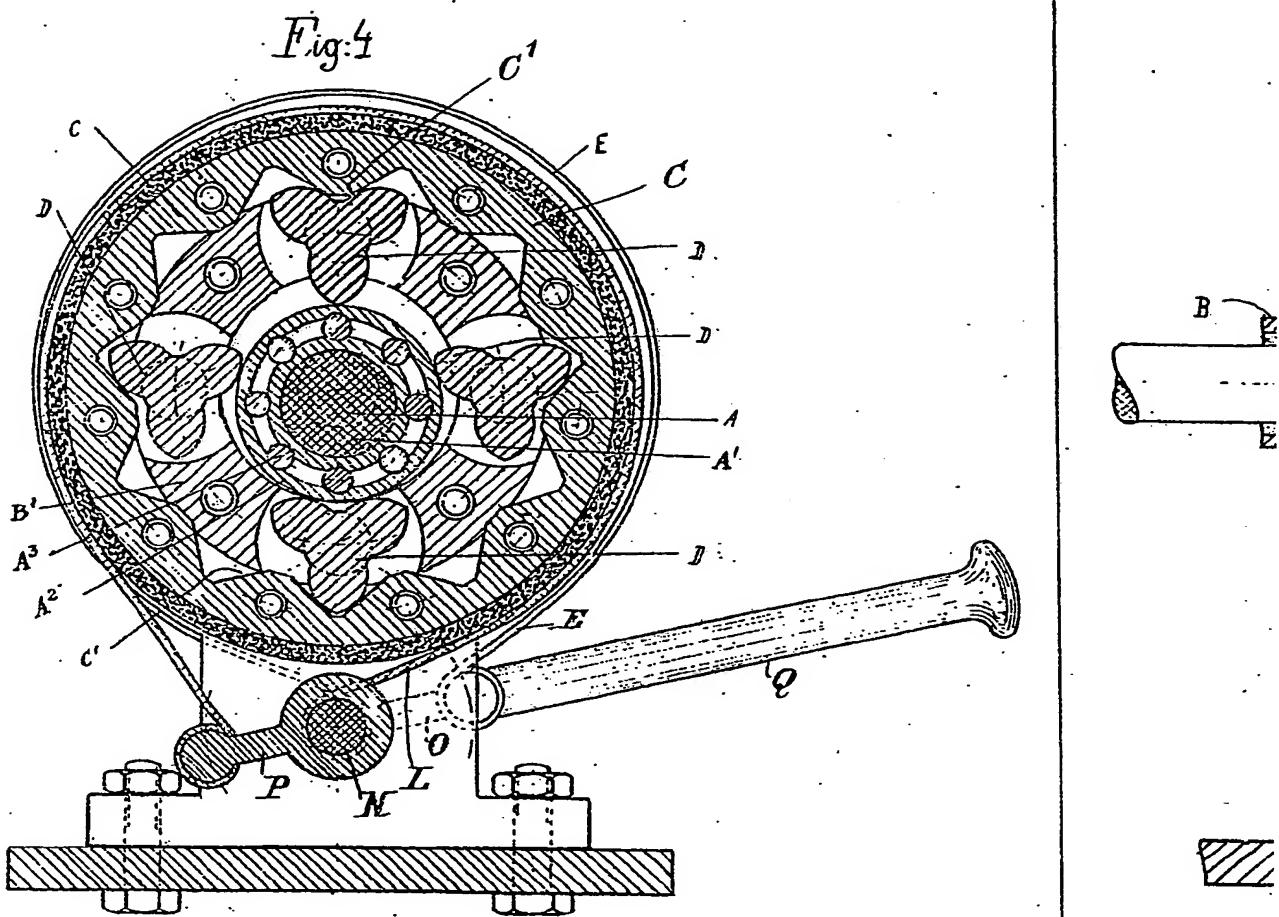
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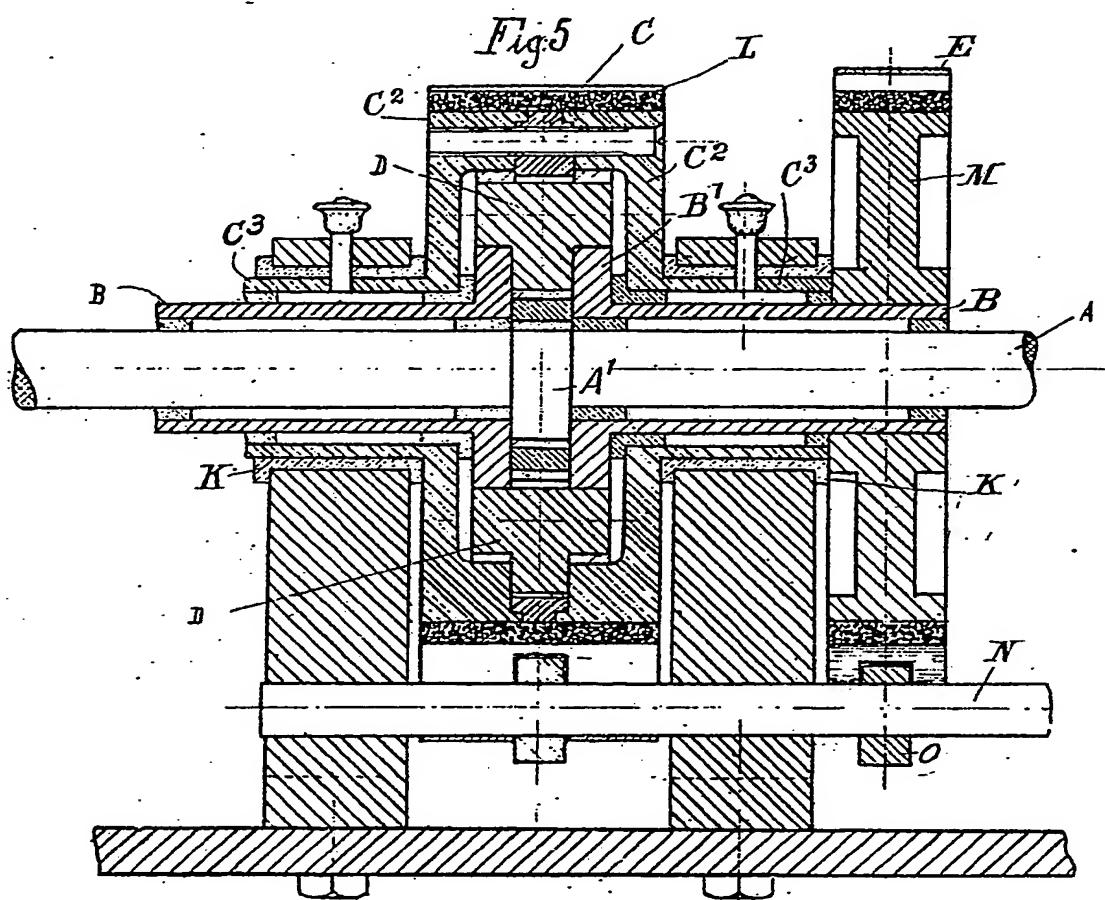
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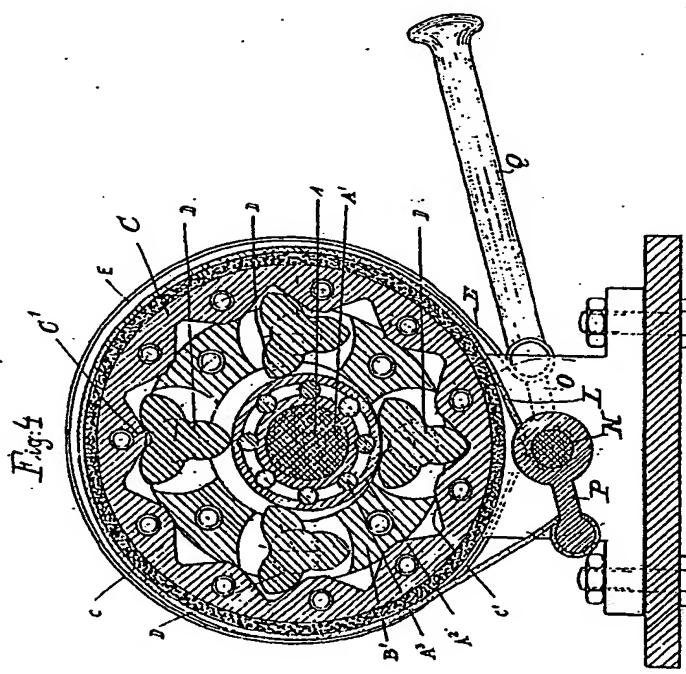
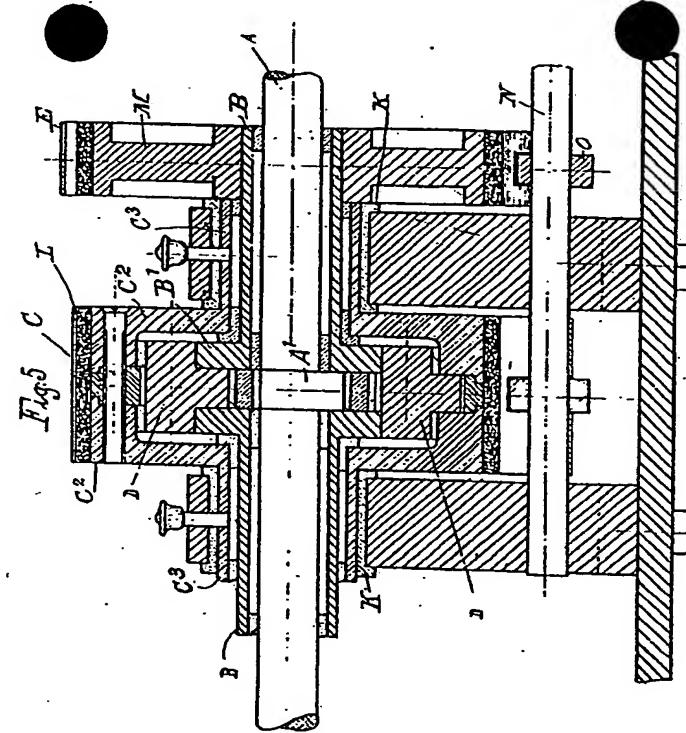
Fig. 3



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